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SCIENCE

OF

ARITHMETIC.

IN THREE PARTS.

PART I.

PRIMARY ARITHMETIC.

BEING AN

EXPLANATION OF THE DECIMAL SYSTEM OF EXPRESSING NUMBERS, AND THE ELEMENTARY PROCESSES OF NUMERICAL CALCULATION.

BOSTON:
TICKNOR, REED, AND FIELDS.
M DCCC XLIX.

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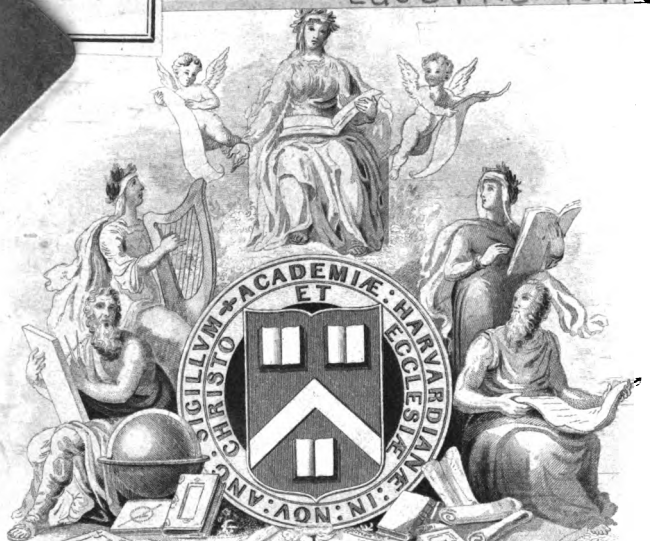

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BY

WILLIAM A. SHEPARD,

LATE PRINCIPAL OF THE MATHEMATICAL DEPARTMENT OF THE BRIMMER SCHOOL, BOSTON.

BOSTON:
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MDCCCXLIX.

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PREFACE.

THIS little work, the first of a series, is prepared with the belief that the simplest and easiest method of teaching arithmetic to the young pupil, is to explain to him, at the very beginning of the course of instruction, the system upon which numbers are based, and to make perfectly clear to his mind the principles which govern the different processes of numerical calculation.

With this view, the author has endeavored to render as simple as possible the explanations of the decimal system of expressing numbers, and the statement and illustration of the four elementary processes which effect the increase and diminution of numbers.

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NOTE TO THE TEACHER.

TEACHERS should read and carefully explain to the pupils, who are commencing the study of this work, each successive lesson; and then require them to study and recite each lesson, though not of course in the same manner as they would require the more advanced classes to study and recite; for the young pupil requires constant assistance at first, in order to acquire a clear and distinct impression of the ideas conveyed in the lesson. For this reason, familiar illustrations upon the black-board should constantly be made by the teacher, in the explanation of the advance lessons to the younger pupils.

THE second part of this series will be published in a short time, — containing practical exercises, both mental and written, in the application of the four elementary processes to the calculations of questions in integral numbers, both simple and compound, and in fractional parts.

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SCIENCE OF ARITHMETIC.

SECTION I.

NUMERATION, OR THE NAMING OF NUMBERS.

I HAVE several marbles, and I wish to know how many I have. The name which answers the question how many is called a number. Thus suppose I take from a box of marbles a single marble, I say that I have *one* marble; — the name or number which expresses how many being in this instance *one*. If I take another marble, I must use some other name to express how many I have, for I have more than *one*, and I say I have *two* marbles, — *two* being the name or number which I use to express how many marbles I have. If I take still another marble, I must use a new name to express how many marbles there are, and I say I have *three* marbles, *three* being the number. Thus I use a new name to express how many I have, every time I take a marble from the box to place with the marbles which I already have. If I place another marble with the three marbles, the name expres-

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sing how many I shall then have will be *four*. If still another, I shall have *five;* one more, and I shall have *six;* one more will make *seven*, another will make *eight*, another will make *nine*, and still another will make *ten* marbles.

The names used to express these numbers are given below, with a table representing the number of marbles expressed by each name as above given.

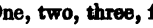
The pupil should be taught to count these dots thus: —

One.

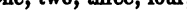
One, two.

One, two, three.

One, two, three, four.



One, two, three, four, five



One, two, three, four, five, six.

One, two, three, four, five, six, seven.

One, two, three, four, five, six, seven, eight.

One, two, three, four, five, six, seven, eight, nine.

One, two, three, four, five, six, seven, eight, nine, ten.

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These names are the names of the numbers, and not of the marbles, and I can count these numbers without the marbles; thus, *one*, *two*, *three*, *four*, *five*, *six*, *seven*, *eight*, *nine*, *ten*.

When it is required to express more than *ten*, other names are used which are names of the numbers larger than *ten*; thus the number one greater than *ten* is called *eleven*, and the number one greater than *eleven* is called *twelve*. Most of the numbers above twelve are expressed by names which are composed of the first ten numbers. Thus the number next above twelve is called *thirteen*, a name composed of the names *three* and *ten*, because *three* and *ten* make the number called *thirteen*. *Fourteen*, the next number above *thirteen*, is so called because *four* and *ten* compose that number. *Fifteen* is so named from the numbers *five* and *ten*. *Sixteen* from the numbers *six* and *ten*; *seventeen* from the numbers *seven* and *ten*; *eighteen* from the numbers *eight* and *ten*; and *nineteen* from the numbers *nine* and *ten*.

Twenty, the next number above *nineteen*, is so called because it contains *two tens*. Then follow the names of the numbers formed by adding the first nine numbers to *twenty*. Thus, the next number above *twenty* is *twenty-one*; the next is *twenty-two*; and so on, until the first nine numbers are added successively; thus, *twenty-three*; *twenty-four*; *twenty-five*; *twenty-six*; *twenty-seven*; *twenty-eight*; *twenty-nine*. The next number above *twenty-nine* is called *thirty*, because it contains *three tens*. The next nine numbers are formed by adding the first nine numbers separately in their order to *thirty*. Thus,

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they are *thirty-one; thirty-two; thirty-three; thirty-four; thirty-five; thirty-six; thirty-seven; thirty-eight; thirty-nine.* The next number above *thirty-nine* contains *four tens*, and is therefore called *forty*. The next nine numbers are formed as above by adding to *forty* the first nine numbers, and are *forty-one*, *forty-two*, and so on to the next number above *forty-nine*, which is called *fifty*, because it contains *five tens*. Then follow the numbers *fifty-one*, *fifty-two*, &c., to the number containing *six tens*, which is called *sixty*. The numbers above *sixty* are *sixty-one*, *sixty-two*, &c., to the number containing *seven tens*, which is called *seventy*. The numbers above *seventy* are *seventy-one*, *seventy-two*, &c., to *eighty*, which contains *eight tens*. The numbers above *eighty* are *eighty-one*, *eighty-two*, &c., to the number containing *nine tens*, which is *ninety*. The numbers above *ninety*, are *ninety-one*, *ninety-two*, &c., to the number containing *ten tens*, which is called *one hundred*, and which contains as many times *ten* as there are times *one* in *ten*. Thus, *one hundred* contains *ten* times *ten*, and *ten* contains *ten* times *one*.

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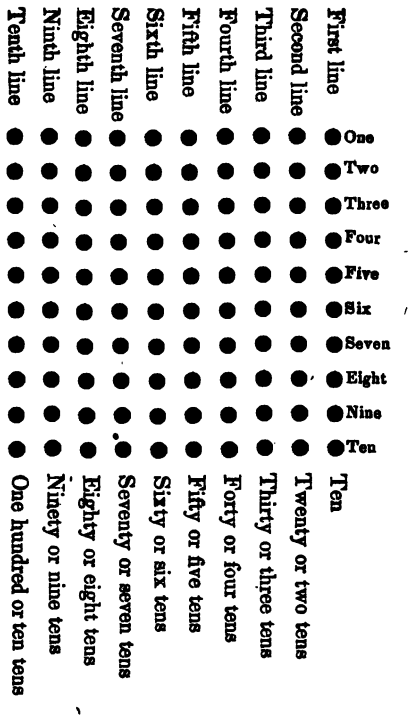
The pupil should be taught to count the points in the following table, until he can count them with them with ease and rapidity.



All the numbers above given are merely a certain number of times *one*, or so many units; because ten is simply ten units, and any number of tens will be so many tens of units; and ten tens, which are called one hundred, are simply one hundred units.

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We observe that we counted ten *ones* to make one *ten*, and ten *tens* to make *one hundred;* and in counting the numbers above *one hundred* we will pursue the same plan, and count *one hundred* over ten times in like manner; thus *one hundred* and *one*, *one hundred* and *two*, *one hundred* and *three*, and so on to *one hundred* and *ten*, *one hundred* and *twenty*, &c., up to *two hundred*. Then again we count on *two hundred* and *one*, *two hundred* and *two*, and so on up to *three hundred*, then in like manner to *four hundred*, to *five hundred*, to *six hundred*, to *seven hundred*, to *eight hundred*, to *nine hundred*, and *ten hundred*, which we call *one thousand*, and which is as many times greater than *one hundred* as *one hundred* is greater than *ten*, or as *ten* is greater than one. That is, *one thousand* is ten times *one hundred; one hundred* is ten times *one ten*, and *ten* is ten times *one* or a unit.

Now, although these different names express numbers very different in value, these numbers are still only so many units as are indicated by the given name. Thus, *ten* signifies ten units; *one hundred* signifies one hundred units; *one thousand* signifies one thousand units. We see, also, that all the different numbers from *one* to *one thousand*, are formed by adding *one* to each of the numbers from *one* to *nine hundred and ninety-nine*. Thus, *one* and *one* are *two; two* and *one* are *three; three* and *one* are *four;* and so on through all the numbers to *one thousand*, for *nine hundred and ninety-nine*, and *one* are *one thousand*.

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SECTION II.

NOTATION, OR THE WRITING OF NUMBERS.

To make the expression of numbers easy and simple, signs or figures have been invented which are used instead of words. A table of the signs or figures used to express the first nine numbers is given in the following table.

1	expresses	One
2	"	Two
3	"	Three
4	"	Four
5	"	Five
6	"	Six
7	"	Seven
8	"	Eight
9	"	Nine

The pupil should be taught these signs until he can give any of them at a glance, and then he may be taught the succeeding lessons in reading numbers expressed by figures.

It will be seen that there is a figure or sign to represent each one of the numbers, or names from *one* to *nine;* but if we should represent each of the numbers from *nine* to *one thousand* by separate signs, it would be difficult to learn and remember so many different signs. Therefore a method of expressing numbers has been invented, which is upon the same plan as that which was invented for naming the numbers from *ten* to *one hundred.*

We remember that in naming the numbers from *ten* to *one hundred,* we used only the names of the first *ten* numbers, placing them

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so as to express any of the numbers which we wished to name. Thus, we remember that the number which is four more than ten was named *fourteen*, because it contained *four and ten;* the number which is four more than two tens or twenty, was named *twenty-four*, because it contained *two tens and four*; and the number which is four more than forty was named *forty-four*, because it contained *four tens and four*, and so on through all the numbers to *one hundred.*

Now if we adopt the same plan, in order to express the numbers from *nine* to *one thousand*, we shall use the nine figures, 1, 2, 3, 4, 5, 5, 7, 8, 9, placed so as to express the numbers which we wish to write. Suppose we wish to write the number *ten*, which is the next number above 9, as we have no figure to express ten, we must use some of the figures which we have already learned.

We remember that in learning to name numbers, one *ten* was ten times greater than *one*, or a *unit*, and that *one hundred* was ten times greater than *one ten*, and that *one thousand* was ten times greater than *one hundred.* Now each of these different names, — *units*, *tens*, *hundreds*, *thousands*, — have different ranks, each one of which is ten times greater than the next lower.

We will make a table showing these different ranks placed in a line, beginning with the rank of *units* at the right hand, and placing next the *tens*, then the *hundreds*, and then the *thousands*, in order at the left hand. First we will show the different places which these different ranks of *units*, *tens*, *hundreds*,

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and *thousands* will occupy, without writing any figures in those places; and in order to do this, we will write in each of the places this sign 0, which is called zero, which signifies nothing, and when it is found in the place of any of the ranks, units, tens, hundreds, thousands, it shows that there is no figure to be counted in that rank. We will now make the table showing the different ranks with 0 in the place of each rank. Thus,

Thousands	Hundreds	Tens	Units
0	0	0	0

In this table the first place at the right hand is the *units'* place, and any figure written in that place will express so many *units;* the next place at the left, or the next place above that of *units*, is the *tens'* place, and any figure written in that place will express *tens*. The next place at the left hand of the tens' place is that of *hundreds*, and any figure written in that place will express *hundreds*. The place at the left hand of the *hundreds* is that of *thousands*, and any figure written in that place will express *thousands*.

I have explained how to write the first nine numbers with figures, and now I wish to write the succeeding numbers, *ten*, *eleven*, *twelve*, *thirteen*, &c. with figures. I shall need only two places to write these numbers, because they contain only two places, the *tens'* place and the *units'* place, and the table for these two places will be thus:

Tens	Units
0	0

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Now, if I wish to write the next number above nine, which is *ten*, I have only to write 1

Tens Units

in the *tens'* place, thus, 1 0, because 1 written in the *tens'* rank is ten times as great as 1 written in the *units'* place, and therefore is equal to *ten units* or *ten*. If I wish to write *eleven*, which contains *one ten* and *one unit*, I write 1 in the

Tens Units

tens' place and 1 in the *units'* place thus, 1 1, and I have *one ten* and *one unit* or *eleven*. *Twelve* will be written thus, 12, because it contains *one ten* and *two units*. *Thirteen* will be written thus, 13, because it contains *one ten* and *three units*; *fourteen* thus, 14, and so on through all the numbers which contain only *tens* and *units*. The following is a table of some of the numbers from nine to one hundred, with the names of the numbers which are expressed in figures, written opposite to them.

10	expresses	Ten
11	"	Eleven
12	"	Twelve
13	"	Thirteen
14	"	Fourteen
15	"	Fifteen
16	"	Sixteen
17	"	Seventeen
18	"	Eighteen
19	"	Nineteen
20	"	Twenty or two tens
21	"	Twenty-one
22	"	Twenty-two

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23	expresses	Twenty-three, and so on to
29	"	Twenty-nine
30	"	Thirty, or three tens
31	"	Thirty-one, and so on to
40	"	Forty or four tens
41	"	Forty-one, and so on to
50	"	Fifty or five tens
51	"	Fifty-one, and so on to
60	"	Sixty or six tens
61	"	Sixty-one, and so on to
70	"	Seventy or seven tens
71	"	Seventy-one, and so on to
80	"	Eighty or eight tens
81	"	Eighty-one, and so on to
90	"	Ninety or nine tens
91	"	Ninety-one, and so on to
99	"	Ninety-nine.

The next number to be expressed is *one hundred*, which is equal to *ten tens*. Therefore as *ten tens* make *one hundred*, I write 1 in the *hundreds'* place, and that will express *one hundred.*

Hundreds	Tens	Units
1	0	0

Thus, 1 0 0 expresses *one hundred.*

All the numbers from one hundred to two hundred contain *one hundred* and a certain number of tens and units, and they can be expressed by writing 1 in the *hundreds'* place, and the *tens* and *units* in their own places. Thus,

101	expresses	One	hundred	and	one
102	"	"	"	"	two
103	"	"	"	"	three

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	109 expresses	One hundred	and	nine	
	110	"	"	"	" ten
	111	"	"	"	" eleven
	112	"	"	"	" twelve
	113	"	"	"	" thirteen
and so on to	120	"	"	"	" twenty
	121	"	"	"	" twenty-one
and so on to	130	"	"	"	" thirty
	131	"	"	"	" thirty-one
and so on to	140	"	"	"	" forty
to	200	"	Two hundred		
to	300	"	Three hundred		
to	900	"	Nine hundred		
to	999	"	Nine hundred and ninety-nine		

The next number above 999 is *one thousand*, which is equal to *ten hundreds*, and therefore is expressed by writing 1 in the *thousands'* place, because *ten hundreds* make *one thousand*. Thus,

1000 expresses *one thousand*.

The pupil should be exercised carefully in reading the above numbers, and then learn to answer the following questions upon the foregoing sections; the teacher using the black-board whenever the question requires it.

1. How many units make one ten?
2. How many tens make one hundred?
3. How many hundreds make one thousand?
4. How many units make one hundred?
5. How many units make one thousand?
6. How many places are required to write units?
7. How many places are required to write tens?
8. How many places are required to write hundreds?
9. How many places are required to write thousands?
10. What do I write in those places in any number where there are no figures to be written?
11. How shall I write 5 units?
12. How shall I write 5 tens or fifty?
13. How shall I write 1 hundred?

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14. How shall I write 1 thousand?
15. What do the zeros mean in 1000?
16. How many times greater is 1 in the thousands' place, than 1 in the hundreds' place?
17. How many times greater is 5 in the hundreds' place, than 5 in the tens' place?
18. How many times greater is 5 in the tens' place, than 5 in the units' place?
19. How many times greater is 5 in the hundreds' place, than 5 in the units' place?
20. How many times greater is 1 in the thousands' place, than 1 in the units' place?
21. How shall I write eleven?
22. How many times greater is the left hand 1 than the right hand 1?
23. How shall I write twenty-two?
24. How many times greater is the 2 in the left hand place in 22, than the 2 in the right hand place?
25. How shall I write one hundred and eleven?
26. How many times greater is the left hand 1 in 111, than the right hand 1?
27. How shall I write one thousand one hundred and eleven?
28. How many times greater is the left hand 1 than the right hand 1, in one thousand one hundred and eleven?
29. How shall I write one hundred and ninety-nine?
30. How many times greater is the left hand 9 in 999 than the right hand 9?
31. How shall I write one thousand and one?
32. How shall I write one thousand and ninety?
33. In what place is the right hand 1 in 1010?
34. In what place is the left hand 1 in 1010?
35. What does the right hand zero mean in 1010?
36. What does the left hand zero mean in 1010?
37. How shall I write fifteen? how shall I write twenty-five?
38. How shall I write one hundred and one?
39. How shall I write two hundred and seventy-five?
40. How shall I write nine hundred and ninety?
41. How shall I write one thousand eight hundred and forty-nine?

The pupil after having been thoroughly exercised in the foregoing questions, may proceed to the third section.

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SECTION III.

ADDITION.

We remember that in naming the numbers, we called one and one, two ones or two; that we called two and one, three ones or three; and that three and one we called four; four and one, five, and so on. Now we see that all the numbers above one are formed by adding several ones together, thus: one added to one makes two; one added to two ones or two makes three; one added to three ones makes four; one added to four makes five; one added to five makes six; one to six makes seven, and one makes eight, and one makes nine, and one more makes ten.

Now if I write two ones, 1, 1, and then write two more ones, 1, 1, how many ones will be written in all? Counting all the ones, I find that there are four ones, or four; therefore two and two equal four. If I write three ones 1, 1, 1, or 3 upon the *board*, and then write three more ones 1, 1, 1, or another 3, how many ones will there be in both 3s? Counting the ones, I find there are six ones in both 3s; therefore 3 and 3, or 3 added to 3, are equal to six. If I write four ones 1, 1, 1, 1, or 4, and then write two ones 1, 1, or 2, how many ones will there be in both these numbers? Counting, I find there are six ones or 6 in 4 and 2; therefore, 4 added to 2 are equal to 6. If I write five ones, 1, 1, 1, 1, 1, or 5, and 1 upon the board, how many will be written in both numbers? Counting, I find there are six, therefore 5

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added to one are equal to 6. If I write the numbers 5, 2, and 1, how many shall I have written in all? Counting, I find there are eight in all; therefore 5 added to 2 added to 1 are equal to 8.

The pupil may now be thoroughly exercised in the following tables.

---

1. 1 and 1 are 2
2. 2 and 1 are 3
3. 3 and 1 are 4
4. 4 and 1 are 5
5. 5 and 1 are 6
6. 6 and 1 are 7
7. 7 and 1 are 8
8. 8 and 1 are 9
9. 9 and 1 are 10
10. 10 and 1 are 11

11. 1 and 2 are 3
12. 2 and 2 are 4
13. 3 and 2 are 5
14. 4 and 2 are 6
15. 5 and 2 are 7
16. 6 and 2 are 8
17. 7 and 2 are 9
18. 8 and 2 are 10
19. 9 and 2 are 11
20. 10 and 2 are 12

21. 1 and 3 are 4
22. 2 and 3 are 5
23. 3 and 3 are 6
24. 4 and 3 are 7
25. 5 and 3 are 8
26. 6 and 3 are 9
27. 7 and 3 are 10
28. 8 and 3 are 11
29. 9 and 3 are 12
30. 10 and 3 are 13

31. 1 and 4 are 5
32. 2 and 4 are 6
33. 3 and 4 are 7
34. 4 and 4 are 8
35. 5 and 4 are 9
36. 6 and 4 are 10
37. 7 and 4 are 11
38. 8 and 4 are 12
39. 9 and 4 are 13
40. 10 and 4 are 14

41. 1 and 5 are 6
42. 2 and 5 are 7
43. 3 and 5 are 8
44. 4 and 5 are 9
45. 5 and 5 are 10
46. 6 and 5 are 11
47. 7 and 5 are 12
48. 8 and 5 are 13
49. 9 and 5 are 14
50. 10 and 5 are 15

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51. 1 and 6 are 7
52. 2 and 6 are 8
53. 3 and 6 are 9
54. 4 and 6 are 10
55. 5 and 6 are 11
56. 6 and 6 are 12
57. 7 and 6 are 13
58. 8 and 6 are 14
59. 9 and 6 are 15
60. 10 and 6 are 16

61. 1 and 7 are 8
62. 2 and 7 are 9
63. 3 and 7 are 10
64. 4 and 7 are 11
65. 5 and 7 are 12
66. 6 and 7 are 13
67. 7 and 7 are 14
68. 8 and 7 are 15
69. 9 and 7 are 16
70. 10 and 7 are 17

71. 1 and 8 are 9
72. 2 and 8 are 10
73. 3 and 8 are 11
74. 4 and 8 are 12
75. 5 and 8 are 13
76. 6 and 8 are 14
77. 7 and 8 are 15
78. 8 and 8 are 16
79. 9 and 8 are 17
80. 10 and 8 are 18

81. 1 and 9 are 10
82. 2 and 9 are 11
83. 3 and 9 are 12
84. 4 and 9 are 13
85. 5 and 9 are 14
86. 6 and 9 are 15
87. 7 and 9 are 16
88. 8 and 9 are 17
89. 9 and 9 are 18
90. 10 and 9 are 19

91. 1 and 10 are 11
92. 2 and 10 are 12
93. 3 and 10 are 13
94. 4 and 10 are 14
95. 5 and 10 are 15
96. 6 and 10 are 16
97. 7 and 10 are 17
98. 8 and 10 are 18
99. 9 and 10 are 19
100. 10 and 10 are 20

5 and 1 and 2 are 8
5 and 2 and 3 are 10
5 and 3 and 4 are 12
5 and 4 and 5 are 14
5 and 5 and 6 are 16
5 and 6 and 7 are 18
5 and 7 and 8 are 20
5 and 8 and 9 are 22
5 and 9 and 10 are 24

6 and 1 and 2 are 9
6 and 2 and 3 are 11
6 and 3 and 4 are 13
6 and 4 and 5 are 15
6 and 5 and 6 are 17

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6 and 6 and 7 are 19
6 and 7 and 8 are 21
6 and 8 and 9 are 23
6 and 9 and 10 are 25

7 and 1 and 2 are 10
7 and 2 and 3 are 12
7 and 3 and 4 are 14
7 and 4 and 5 are 16
7 and 5 and 6 are 18
7 and 6 and 7 are 20
7 and 7 and 8 are 22
7 and 8 and 9 are 24
7 and 9 and 10 are 26

8 and 1 and 2 are 11
8 and 2 and 3 are 13
8 and 3 and 4 are 15
8 and 4 and 5 are 17
8 and 5 and 6 are 19
8 and 6 and 7 are 21
8 and 7 and 8 are 23
8 and 8 and 9 are 25
8 and 9 and 10 are 27

9 and 1 and 2 are 12
9 and 2 and 3 are 14
9 and 3 and 4 are 16
9 and 4 and 5 are 18
9 and 5 and 6 are 20
9 and 6 and 7 are 22
9 and 7 and 8 are 24
9 and 8 and 9 are 26
9 and 9 and 10 are 28

10 and 1 and 2 are 13
10 and 2 and 3 are 15
10 and 3 and 4 are 17
10 and 4 and 5 are 19
10 and 5 and 6 are 21
10 and 6 and 7 are 23
10 and 7 and 8 are 25
10 and 8 and 9 are 27
10 and 9 and 10 are 29
10 and 10 and 10 are 30

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1. If I read two pages of a book in the morning, and two pages in the evening; how many pages shall I read in the day?

2. 2 and 2 are how many?

3. James received two cents from his brother, and three cents from his father; how many cents did he receive?

4. 2 and 3 are how many? 3 and 2 are how many?

5. William paid two cents for a pencil, and four cents for a slate; how many cents did he pay for both?

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6. 2 and 4 are how many? 4 and 2 are how many?

7. If you walk two miles in one day, and five miles in the next day; how many miles will you walk in the two days?

8. 2 and 5 are how many? 5 and 2 are how many?

9. If I perform two examples in Arithmetic, and James performs six examples; how many examples shall we both perform?

10. 2 and 6 are how many? 6 and 2 are how many?

11. William caught two robins and seven blackbirds, how many birds did he catch in all?

12. 2 and 7 are how many? 7 and 2 are how many?

13. If a horse walks two miles in one hour, and then trots eight miles in the next hour; how many miles will he have travelled?

14. 2 and 8 are how many? 8 and 2 are how many?

15. James won two marbles of William, and nine marbles of George; how many marbles did he win?

16. 2 and 9 are how many? 9 and 2 are how many?

17. George received two flowers from his father, and Jane received ten flowers from a gardener; how many did they both receive?

18. 2 and 10 are how many? 10 and 2 are how many?

19. If a miller sell three bushels of corn to one man, and three bushels to another man; how many bushels does he sell to them both?

20. 3 and 3 are how many?

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21. George bought two fishing lines; in one line there were three yards, and in the other line there were four yards; how many yards were there in both?

22. 3 and 4 are how many? 4 and 3 are how many?

23. A flour dealer bought three barrels of flour of one man, and five barrels of another man; how many barrels did he buy?

24. 3 and 5 are how many? 5 and 3 are how many?

25. A gardener planted three trees in one row, and six trees in another; how many trees did he plant in the two rows?

26. 3 and 6 are how many? 6 and 3 are how many?

27. Charles attended a primary school three years, and a grammar school seven years; how many years did he attend school?

28. 3 and 7 are how many? 7 and 3 are how many?

29. A fowler shot three birds in the morning, and eight birds in the afternoon; how many birds did he shoot in the whole day?

30. 3 and 8 are how many? 8 and 3 are how many?

31. Jane had three books, and her mother gave her nine books; how many books did Jane then have?

32. 3 and 9 are how many? 9 and 3 are how many?

33. A farmer paid three dollars for a sheep, and ten dollars for a calf; how much did he pay for both?

34. 3 and 10 are how many? 10 and 3 are how many?

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35. If you should pay four cents for an orange, and four cents for an apple; how many cents would you spend?

36. 4 and 4 are how many?

37. William has lived four years in the country, and five years in the city; how old is he?

38. 4 and 5 are how many? 5 and 4 are how many?

39. A man paid four dollars for travelling in the cars, and six dollars for travelling in the stage; how much did he expend in travelling?

40. 4 and 6 are how many? 6 and 4 are how many?

41. There were four sheep in one field, and seven sheep in another; how many sheep were there in both fields?

42. 4 and 7 are how many? 7 and 4 are how many?

43. There are four windows on one side of a house, and eight windows on another side; how many windows are there on both sides?

44. 4 and 8 are how many? 8 and 4 are how many?

45. Four boys in a class have recited, and there are nine more boys to recite; how many boys are there in the class?

46. 4 and 9 are how many? 9 and 4 are how many?

47. I paid four cents for a ball, and ten cents for a kite; how many cents did I pay for both?

48. 4 and 10 are how many? 10 and 4 are how many?

49. A lady paid five dollars for a bonnet, and five dollars for a shawl; how many dollars did she pay for both?

50. 5 and 5 are how many?

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51. A boy dug five bushels of potatoes, and a man dug six bushels of potatoes; how many bushels of potatoes did they both dig?

52. 5 and 6 are how many? 6 and 5 are how many?

53. Charles had five dollars, and his father gave him seven dollars more; how many dollars did he then have?

54. 5 and 7 are how many? 7 and 5 are how many?

55. If I write five pages in one hour, and eight pages in the next hour; how many pages do I write in the two hours?

56. 5 and 8 are how many? 8 and 5 are how many?

57. A farmer had five cows, and bought nine cows more; how many cows did he then have?

58. 5 and 9 are how many? 9 and 5 are how many?

59. George had five pens, and his father gave him ten more; how many pens did he then have?

60. 5 and 10 are how many? 10 and 5 are how many?

61. If I buy six pencils at one store, and six pencils more at another store; how many pencils shall I have in all?

62. 6 and 6 are how many?

63. George received six credits from his teacher in the morning, and seven credits in the afternoon; how many credits did he receive in all?

64. 6 and 7 are how many? 7 and 6 are how many?

65. Six passengers were riding in a stage, and the driver admitted eight more; how many passengers were there then in the stage?

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66. 6 and 8 are how many? 8 and 6 are how many?

67. James while going to school, gathered six flowers, and while returning home gathered nine more; how many flowers did he gather?

68. 6 and 9 are how many? 9 and 6 are how many?

69. There are six birds in one cage, and ten birds in another; how many birds are there in both cages?

70. 6 and 10 are how many? 10 and 6 are how many?

71. If seven bushels of apples grow on one tree, and seven on another tree; how many bushels of apples grow on both trees?

72. 7 and 7 are how many?

73. There are seven cords of wood in one pile, and eight cords in another pile; how many cords are there in both piles?

74. 7 and 8 are how many? 8 and 7 are how many?

75. A thief stole seven dollars from one man, and nine dollars from another; how many dollars did he steal?

76. 7 and 9 are how many? 9 and 7 are how many?

77. There are seven shelves on one side of a store, and ten shelves on another side; how many shelves are there on both sides of the store?

78. 7 and 10 are how many? 10 and 7 are how many?

79. A trader sold eight yards of cloth to one man, and eight yards more to another man, how many yards did he sell to both men?

80. 8 and 8 are how many?

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81. George paid eight cents for a slate, and had nine cents remaining; how many cents had he at first?

82. 8 and 9 are how many? 9 and 8 are how many?

83. A teacher gave eight pens to one boy, and ten pens to another boy; how many pens did he give to both boys?

84. 8 and 10 are how many? 10 and 8 are how many?

85. Nine boys were sailing in a boat, and they took in nine boys more; how many boys were then in the boat?

86. 9 and 9 are how many?

87. Nine men were liberated from a prison, and ten men still remained; how many men were there in the prison at first?

88. 9 and 10 are how many? 10 and 9 are how many?

89. William paid ten cents for paper, and ten cents for pens; how many cents did he pay away?

90. 10 and 10 are how many?

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1. In a primary school five pupils of the first class, six pupils of the second class, and seven pupils of the third class, study arithmetic; how many pupils study arithmetic in that school?

5 and 6 and 7 are how many? 11 and 7 are how many? 5 and 13 are how many?

2. There are in my garden six pear trees, seven apple trees, and eight peach trees; how many fruit trees are there in all?

6 and 7 and 8 are how many? 13 and 8 are how many? 6 and 15 are how many?

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3. John has some English rabbits in three different pens; seven in one, eight in another, and nine in the third; how many had he in all?

7 and 8 and 9 are how many? 15 and 9 are how many? 7 and 17 are how many?

4. A man spent eight years of his life in France, nine years in England, and ten years in America, how old was he?

8 and 9 and 10 are how many? 17 and 10 are how many? 8 and 19 are how many?

5. A grocer sold flour for two dollars, molasses for three dollars, sugar for four dollars, and rice for five dollars; how many dollars did he receive in all?

2 and 3 and 4 and 5 are how many? 5 and 4 and 5 are how many? 2 and 7 and 5 are how many? 5 and 9 are how many?

6. Four laborers received payment for their labor, the first received three dollars, the second four dollars, the third five dollars, and the fourth six dollars; how much did they receive in all?

3 and 4 and 5 and 6 are how many? 7 and 5 and 6 are how many? 3 and 9 and 6 are how many? 7 and 11 are how many?

7. I have employed in building my house four stone-cutters, five painters, six masons, and seven capenters; how many workmen have I employed in all?

4 and 5 and 6 and 7 are how many? 9 and 6 and 7 are how many? 4 and 11 and 7 are how many? 9 and 13 are how many?

8. A gentleman paid to his servant five dollars at one time, six dollars at another time, seven at another, and eight at another; how many dollars did he pay him in all?

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5 and 6 and 7 and 8 are how many? 11 and 7 and 8 are how many? 5 and 13 and 8 are how many? 11 and 15 are how many?

9. A gentleman has in his grounds six elm trees, seven oak trees, eight chestnut trees, and nine sycamore trees; how many trees were there in all?

6 and 7 and 8 and 9 are how many? 13 and 8 and 9 are how many? 6 and 15 and 9 are how many? 13 and 17 are how many?

10. James has seven marbles, John has eight, William nine, and George ten; how many marbles have they in all?

7 and 8 and 9 and 10 are how many? 15 and 9 and 10 are how many? 7 and 17 and 10 are how many? 15 and 19 are how many?

SECTION IV.

SECOND METHOD OF ADDITION, OR MULTIPLICATION.

1 and 1 are 2	6 and 6 are 12
Twice one are 2	Twice six are 12
2 and 2 are 4	7 and 7 are 14
Twice two are 4	Twice seven are 14
3 and 3 are 6	8 and 8 are 16
Twice three are 6	Twice eight are 16
4 and 4 are 8	9 and 9 are 18
Twice four are 8	Twice nine are 18
5 and 5 are 10	10 and 10 are 20
Twice five are 10	Twice ten are 20

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1 and 1 and 1 are 3	6 and 6 and 6 are 18
Three times one are 3	Three times six are 18
2 and 2 and 2 are 6	7 and 7 and 7 are 21
Three times 2 are 6	Three times seven are 21
3 and 3 and 3 are 9	8 and 8 and 8 are 24
Three times three are 9	Three times eight are 24
4 and 4 and 4 are 12	9 and 9 and 9 are 27
Three times four are 12	Three times nine are 27
5 and 5 and 5 are 15	10 and 10 and 10 are 30
Three times five are 15	Three times ten are 30

We see that in obtaining the answers to the above examples, each number is added several times to itself; that in answering the question (4 and 4 and 4 are how many?) we add 4 to itself twice, thus, 4 and 4 are 8, and 4 are 12; when a number is added several times to itself, as in the above example, we say that it is *multiplied*, that is, several times its own value is taken. Thus, when 4 is taken three times, it is said to be multiplied by 3. The operation by which a number is multiplied is called *Multiplication;* but *multiplication* is only a short way of adding a number several times to itself.

Now if I wish to signify that a number is to be added several times to itself; that is, if I wish to multiply a number by any other, instead of writing the number several times, and adding the numbers, I write the number to be multiplied, and after that number, the number by which it is to be multiplied. Thus, if I wish to add 5 several times to itself, suppose, for instance, that I wish to add four 5s together; instead of writing 5 and 5 and 5 and 5 are 20, I should write

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5 multiplied by 4 are 20, or four times five are twenty. The following table will illustrate the multiplication of numbers.

Once 1 is 1
Once 2 are 2
Once 3 are 3
Once 4 are 4
Once 5 are 5
Once 6 are 6
Once 7 are 7
Once 8 are 8
Once 9 are 9
Once 10 are 10

2 times 1 are 2
2 times 2 are 4
2 times 3 are 6
2 times 4 are 8
2 times 5 are 10
2 times 6 are 12
2 times 7 are 14
2 times 8 are 16
2 times 9 are 18
2 times 10 are 20

3 times 1 are 3
3 times 2 are 6
3 times 3 are 9
3 times 4 are 12
3 times 5 are 15
3 times 6 are 18
3 times 7 are 21
3 times 8 are 24
3 times 9 are 27
3 times 10 are 30

4 times 1 are 4
4 times 2 are 8
4 times 3 are 12
4 times 4 are 16
4 times 5 are 20
4 times 6 are 24
4 times 7 are 28
4 times 8 are 32
4 times 9 are 36
4 times 10 are 40

5 times 1 are 5
5 times 2 are 10
5 times 3 are 15
5 times 4 are 20
5 times 5 are 25
5 times 6 are 30
5 times 7 are 35
5 times 8 are 40
5 times 9 are 45
5 times 10 are 50

6 times 1 are 6
6 times 2 are 12
6 times 3 are 18
6 times 4 are 24
6 times 5 are 30
6 times 6 are 36
6 times 7 are 42
6 times 8 are 48
6 times 9 are 54
6 times 10 are 60

7 times 1 are 7
7 times 2 are 14
7 times 3 are 21
7 times 4 are 28
7 times 5 are 35
7 times 6 are 42
7 times 7 are 49
7 times 8 are 56
7 times 9 are 63
7 times 10 are 70

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8 times 1 are 8
8 times 2 are 16
8 times 3 are 24
8 times 4 are 32
8 times 5 are 40
8 times 6 are 48
8 times 7 are 56
8 times 8 are 64
8 times 9 are 72
8 times 10 are 80

9 times 1 are 9
9 times 2 are 18
9 times 3 are 27
9 times 4 are 36
9 times 5 are 45
9 times 6 are 54
9 times 7 are 63
9 times 8 are 72
9 times 9 are 81
9 times 10 are 90

10 times 1 are 10
10 times 2 are 20
10 times 3 are 40
10 times 5 are 50
10 times 6 are 60
10 times 7 are 70
10 times 8 are 80
10 times 9 are 90
10 times 10 are 100

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1. There are two bird-cages in my room, and two birds in each cage; how many birds are there in both cages?

2 times 2 are how many?

2. There are two carriages passing in the street, and three persons in each carriage; how many persons are there in all?

3 times 2 are how many? 2 times 3 are how many?

3. John bought four oranges, and gave two cents for each; how many cents did he pay for all?

4 times 2 are how many? 2 times 4 are how many?

4. How many dollars must I pay for five barrels of potatoes, if I give two dollars for each barrel?

5 times 2 are how many? 2 times 5 are how many?

5. In the first class of a school there are six boys, and in the second class there are twice as many; how many boys are there in the second class?

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6 times 2 are how many? 2 times 6 are how many?

6. There are two rows of trees, and seven trees in a row; how many trees are there in all?

7 times 2 are how many? 2 times 7 are how many?

7. There are two pastures, each containing eight cows; how many cows are there in both pastures?

8 times 2 are how many? 2 times 8 are how many?

8. There are two baskets of apples, and nine apples in each basket; how many apples are there in both baskets?

9 times 2 are how many? 2 times 9 are how many?

9. Ten men gave money to a poor man, each giving him two dollars; how many dollars did the man receive?

10 times 2 are how many? 2 times 10 are how many?

10. There are two boats crossing a ferry, each containing three men; how many men are there in both boats?

2 times 3 are how many? 3 times 2 are how many?

11. A number of oranges were given to three boys, and each boy received three oranges; how many oranges were distributed?

3 times 3 are how many?

12. If I can perform three examples in arithmetic in one hour; how many examples can I perform in four hours at the same rate?

4 times 3 are how many? 3 times 4 are how many?

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13. Three cents were given to George, and five times as many to Charles; how many cents were given to Charles?

5 times 3 are how many? 3 times 5 are how many?

14. If there are six books in one pile, how many books are there in three piles containing three times as many books?

6 times 3 are how many? 3 times 6 are how many?

15. If three yards of cloth are required to make one coat, how many yards will be required to make seven coats?

7 times 3 are how many? 3 times 7 are how many?

16. George caught eight trout from the brook, and James caught three times as many; how many trout did James catch?

8 times 3 are how many? 3 times 8 are how many?

17. If a man can plane three boards in one hour, how many boards can nine men plane in the same time?

9 times 3 are how many? 3 times 9 are how many?

18. I have a book in which there are ten pages of prose, and three times as many pages of poetry; how many pages of poetry are there?

10 times 3 are how many? 3 times 10 are how many?

19. John bought two pencils at four cents each, how much did he pay for both?

2 times 4 are how many? 4 times 2 are how many?

20. A man sold four shawls at three dollars apiece, how much did he get for them all?

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3 times 4 are how many? 4 times 3 are how many?

21. There are four acres of land in one lot, and four times as many acres in another lot; how many acres are there in the larger lot?

4 times 4 are how many?

22. A man paid four dollars apiece for five chairs; how much did he pay for them all?

5 times 4 are how many? 4 times 5 are how many?

23. How many bags of corn are there in four carts, there being six bags in each cart?

6 times 4 are how many? 4 times 6 are how many?

24. If a man can make four feet of fence in one hour, how many feet of fence can he make in seven hours?

7 times 4 are how many? 4 times 7 are how many?

25. There are four boats sailing on a river, with eight men in each boat; how many men are there in all the boats?

8 times 4 are how many; 4 times 8 are how many?

26. A grocer sold four dozen of eggs at nine cents a dozen, how much did he get for the whole?

9 times 4 are how many? 4 times 9 are how many?

27. George has ten marbles, and James four times as many; how many marbles has James?

10 times 4 are how many? 4 times 10 are how many?

28. If a man should shoot five birds, and a boy twice as many; how many birds would the boy shoot?

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2 times 5 are how many? 5 times 2 are how many?

29. A man gave a number of apples to five boys, giving each boy three apples; how many apples did he give to them all?

3 times 5 are how many? 5 times 3 are how many?

30. James bought four writing books at five cents each, how much did he pay for the four books?

4 times 5 are how many? 5 times 4 are how many?

31. If five sheets of paper were each cut into five equal parts, how many parts would they make?

5 times 5 are how many?

32. In the end of my house there are six windows, and in the front there are five times as many; how many windows are there in the front?

6 times 5 are how many? 5 times 6 are how many?

33. A certain farmer had seven sheep, and his neighbor had five times as many; how many sheep had his neighbor?

7 times 5 are how many? 5 times 7 are how many

34. If a mill grinds eight bushels of corn in one hour, how many bushels will it grind in five hours?

8 times 5 are how many? 5 times 8 are how many?

34. How much money must be paid for five pounds of almonds, at the rate of nine cents a pound?

9 times 5 are how many? 5 times 9 are how many?

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35. How many panes of glass are there in five windows, there being ten panes in each window?

10 times 5 are how many? 5 times 10 are how many?

36. There are two rows of houses, and six houses in a row, how many houses are there in all?

2 times 6 are how many? 6 times 2 are how many?

37. How many pens are there in three bunches, there being six pens in each bunch?

3 times 6 are how many? 6 times 3 are how many?

38. If you can read four pages in one hour, how many pages can you read in six hours?

4 times 6 are how many? 6 times 4 are how many?

39. George paid six cents for paper, and five times as much for a book; how much did he pay for the book?

5 times 6 are how many? 6 times 5 are how many?

40. How many horses are there in six stables, there being six horses in each stable?

6 and 6 are how many?

41. If a barrel of flour be worth six dollars, what is the value of seven barrels of flour?

7 times 6 are how many? 6 times 7 are how many?

42. If I recite six lessons in one week, how many lessons do I recite in eight weeks?

8 times 6 are how many? 6 times 8 are how many?

43. How many bales of cotton can be carried on six wagons, if nine bales be carried on one wagon?

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9 times 6 are how many? 6 times 9 are how many?

44. If a man earns ten dollars in one week, how many dollars will he earn in six weeks?

10 times 6 are how many? 6 times 10 are how many?

45. If a horse eats two quarts of grain in one day, how many quarts will seven horses eat in the same time?

2 times 7 are how many? 7 times 2 are how many?

46. If I recite seven pages of history in one lesson, how many pages of the same do I recite in three lessons?

3 times 7 are how many? 7 times 3 are how many?

47. If a pound of coffee cost seven cents, how much will four pounds of coffee cost?

4 times 7 are how many? 7 times 4 are how many?

48. If a trader can sell flour at the rate of seven barrels in one day, how many barrels can he sell in five days?

5 times 7 are how many? 7 times 5 are how many?

49. How much must I pay for seven yards of broadcloth, the price being six dollars a yard?

6 times 7 are how many? 7 times 6 are how many?

50. How much will a market-man receive for seven dozen of eggs, if he sells them at the rate of seven cents a dozen?

7 times 7 are how many?

51. If a boat sails at the rate of seven miles in an hour, how many miles will she sail in eight hours?

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8 times 7 are how many? 7 times 8 are how many?

51. If a barrel of beef be worth nine dollars, how much are seven barrels of beef worth?

9 times 7 are how many? 7 times 9 are how many?

52. If one melon cost ten cents, how many cents will seven melons cost?

10 times 7 are how many? 7 times 10 are how many?

53. If one orange cost two cents, what will eight oranges cost?

2 times 8 are how many? 8 times 2 are how many?

54. What is the value of three bags of coffee, when coffee is worth eight dollars a bag?

3 times 8 are how many? 8 times 3 are how many?

55. James paid four cents each for eight pencils, how many cents did he pay for the whole?

4 times 8 are how many? 8 times 4 are how many?

56. There are eight quarts in a peck, how many quarts are there in five pecks?

5 times 8 are how many? 8 times 5 are how many?

57. How much will six books cost at eight cents apiece?

6 times 8 are how many? 8 times 6 are how many?

58. If a ton of coal be worth eight dollars, how much are seven tons worth?

7 times 8 are how many? 8 times 7 are how many?

59. Charles has eight marbles, and James has

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eight times as many, how many marbles has James?

8 times 8 are how many?

60. If a barrel of sugar costs nine dollars, how much will eight barrels of sugar cost?

9 times 8 are how many? 8 times 9 are how many?

61. If a steam engine consume eight cords of wood in one week, how many cords will it consume in ten weeks?

10 times 8 are how many? 8 times 10 are how many?

62. How many square feet are there in two boards, there being nine feet in each board?

2 times 9 are how many? 9 times 2 are how many?

63. How many books will supply nine boys, if each boy take three books?

3 times 9 are how many? 9 times 3 are how many?

64. A jeweller has nine rings which he wishes to sell at four dollars apiece, how much ought he to get for the whole?

4 times 9 are how many? 9 times 4 are how many?

65. How many seats are there in five rows, there being nine seats in a row?

5 times 9 are how many? 9 times 5 are how many?

66. How many miles will a boat sail in six hours, if she sail nine miles in one hour?

6 times 9 are how many? 9 times 6 are how many?

67. If it take nine rolls of paper to cover the walls of one room, how many rolls will it take

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to cover the walls of seven rooms, of the same size?

7 times 9 are how many? 9 times 7 are how many?

68. What will nine pounds of sugar cost, at eight cents a pound?

8 times 9 are how many? 9 times 8 are how many?

69. If a hatter make nine hats in one week, how many hats will he make in nine weeks?

9 times 9 are how many?

70. How many dollars are there in nine eagles, there being ten dollars in each eagle?

10 times 9 are how many? 9 times 10 are how many?

71. Two men gave ten dollars each to a poor soldier; how many dollars did the soldier receive?

2 times 10 are how many? 10 times 2 are how many?

72. How many yards are there in three pieces of cloth, there being ten yards in each piece?

3 times 10 are how many? 10 times 3 are how many?

73. If ten yards of cloth are required to make one suit of clothes, how many yards are required to make four suits of clothes?

4 times 10 are how many? 10 times 4 are how many?

74. If a man earns five dollars in one day, how much does he earn in ten days?

5 times 10 are how many? 10 times 5 are how many?

75. How much will six pounds of lead cost, at ten cents a pound?

6 times 10 are how many? 10 times 6 are how many?

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76. A farmer employs seven men, to whom he pays ten dollars each a week; how much does he pay them all in a week?

7 times 10 are how many? 10 times 7 are how many?

77. There are eight pints in one gallon, how many pints are there in ten gallons?

8 times 10 are how many? 10 times 8 are how many?

78. How much must be given for nine sheep at ten dollars apiece?

9 times 10 are how many? 10 times 9 are how many?

79. If I use ten sheets of paper in one day, how many sheets do I use in ten days?

10 times 10 are how many?

SECTION V.

SUBTRACTION.

We remember that all the numbers above 1 were formed by adding 1 to each successive number; thus (two) 2 was formed by adding 1 to 1, which made 2, and 3 was formed by adding 1 to 2, which made 3; 4 was formed by adding 1 to 3, and 5, by adding 1 to 4, &c. Now since these numbers were thus formed by adding 1 to each of the successive numbers, we see that we can take away 1 from any of these numbers; thus 1 taken from 2 leaves 1; 1 taken from 3 leaves 2; and 1 taken from 4 leaves 3. This taking of one number from another we call

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subtraction; and when 1 is taken from any number, we say that it is *subtracted* from that number. We can *subtract* 1 from 1, or any number greater than 1, and we can also *subtract* any other number from any number which is equal to, or greater than that number; thus we can *subtract* 1 from 1, and nothing will be left; we can *subtract* 1 from 2, and 1 will remain; 2 from 4, and 2 will remain. The table given below will illustrate the *subtraction* of numbers.

---

1 less 1 is 0	3 less 3 is 0
2 less 1 is 1	4 less 3 is 1
3 less 1 are 2	5 less 3 are 2
4 less 1 are 3	6 less 3 are 3
5 less 1 are 4	7 less 3 are 4
6 less 1 are 5	8 less 3 are 5
7 less 1 are 6	9 less 3 are 6
8 less 1 are 7	10 less 3 are 7
9 less 1 are 8	11 less 3 are 8
10 less 1 are 9	12 less 3 are 9
11 less 1 are 10	13 less 3 are 10
2 less 2 is 0	4 less 4 is 0
3 less 2 is 1	5 less 4 is 1
4 less 2 are 2	6 less 4 are 2
5 less 2 are 3	7 less 4 are 3
6 less 2 are 4	8 less 4 are 4
7 less 2 are 5	9 less 4 are 5
8 less 2 are 6	10 less 4 are 6
9 less 2 are 7	11 less 4 are 7
10 less 2 are 8	12 less 4 are 8
11 less 2 are 9	13 less 4 are 9
12 less 2 are 10	14 less 4 are 10

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5 less 5 is 0
6 less 5 is 1
7 less 5 are 2
8 less 5 are 3
9 less 5 are 4
10 less 5 are 5
11 less 5 are 6
12 less 5 are 7
13 less 5 are 8
14 less 5 are 9
15 less 5 are 10

6 less 6 is 0
7 less 6 is 1
8 less 6 are 2
9 less 6 are 3
10 less 6 are 4
11 less 6 are 5
12 less 6 are 6
13 less 6 are 7
14 less 6 are 8
15 less 6 are 9
16 less 6 are 10

7 less 7 is 0
8 less 7 is 1
9 less 7 are 2
10 less 7 are 3
11 less 7 are 4
12 less 7 are 5
13 less 7 are 6
14 less 7 are 7
15 less 7 are 8
16 less 7 are 9
17 less 7 are 10

8 less 8 is 0
9 less 8 is 1
10 less 8 are 2
11 less 8 are 3
12 less 8 are 4
13 less 8 are 5
14 less 8 are 6
15 less 8 are 7
16 less 8 are 8
17 less 8 are 9
18 less 8 are 10

9 less 9 is 0
10 less 9 is 1
11 less 9 are 2
12 less 9 are 3
13 less 9 are 4
14 less 9 are 5
15 less 9 are 6
16 less 9 are 7
17 less 9 are 8
18 less 9 are 9
19 less 9 are 10

1. If I have four apples, and give away two of them; how many shall I have left?

4 less 2, are how many

2. John had five marbles, and gave two to James; how many had John left?

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5 less 2, are how many? 6 less 4, are how many?

3. I had seven dollars in my purse, but I paid two dollars for a hat; how many dollars remained in my purse?

7 less 2, are how many? 7 less 5, are how many?

4. Eight doves were sitting on the top of the house, but two of them flew away; how many remained?

8 less 2, are how many? 8 less 6, are how many?

5. James had ten cents, but spent two of them; how many cents had he left?

10 less 2, are how many? 10 less 8, are how many?

6. George had six quarts of chestnuts, and gave three quarts of them to his sister; how many quarts had he left?

6 less 3, are how many?

7. John is seven years old, he lived three years in Boston, the rest of his life he has passed in Salem; how many years has he resided in Salem?

7 less 3, are how many? 7 less 4, are how many?

8. George is eight years old, and William is three; how many years difference are between their ages?

8 less 3, are how many? 8 less 5, are how many?

9. A man filled a cask, that contained ten gallons, with water, but three gallons leaked out; how many gallons remained in the cask?

10 less 3, are how many? 10 less 7, are how many?

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10. If I have eight horses, and sell four; how many horses shall I then have?

8 less 4, are how many?

11. James had nine rabbits, but he gave four away; how many had he left?

9 less 4, are how many? 9 less 5, are how many?

12. John bought ten oranges, but gave his sister four of them; how many had he left?

10 less 4, are how many? 10 less 6, are how many?

13. James and George together had twelve cents; James's share was 5 cents, what was George's share?

12 less 5, are how many? 12 less 7, are how many?

14. A lad had eleven birds, six of them were canary birds, and the rest were sparrows; how many were sparrows?

11 less 6, are how many? 11 less 5, are how many?

15. If I have twelve lemons, and give away eight of them; how many shall I have left?

12 less 8, are how many? 12 less 4, are how many?

Thus far we have subtracted only one number from a greater number; but we can subtract two or more numbers from a number greater than their sum; thus I can subtract two and three from seven, and the remainder will be two; the expression will be thus, — 7 less 2 less 3 are 2.

16. A farmer owned six sheep, but one of them died at one time, and two of them at another; how many sheep had he left?

6 less 1 less 2, are how many? 6 less 3, are how many?

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17. James had seven apples, but he gave his brother two and his sister three; how many had he then?

7 less 2 less 3, are how many? 7 less 5, are how many?

18. Eight carpenters were working upon a house, three of them left at one time and four at another; how many carpenters remained?

8 less 3 less 4, are how many? 8 less 7, are how many?

19. George had nine cents, but he gave his sister three cents, and spent four; how many cents had he left?

9 less 3 less 4, are how many? 9 less 7, are how many?

20. In my first class in school there are three divisions; the first division contains four pupils, and the second five pupils; how many pupils are in the third division, supposing that there are ten pupils in the class?

12 less 4 less 5, are how many? 10 less 9, are how many?

SECTION VI.

SECOND METHOD OF SUBTRACTION, OR DIVISION.

We have in the above examples subtracted different numbers from a greater number, but it sometimes happens that we wish to subtract the same number several times from a greater number. Suppose, for instance, that I have eighteen cents, and wish to know how many quarts of chestnuts I can buy for that sum, when chestnuts

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are worth six cents a quart; I subtract six repeatedly from eighteen to find how many times six is contained in eighteen; thus, 18 less 6 less 6 less 6 is 0; and I find upon subtracting six three times from eighteen that nothing remains, and, consequently, that eighteen contains six exactly three times. Suppose it were required to find how many times three are contained in twelve; the expression will be thus, 12 less 3 less 3 less 3 less 3 is 0. The subtraction fully performed will be thus: 12 less 3 are 9, 9 less 3 are 6, 6 less 3 are 3, 3 less 3 is 0; here it will be seen I have subtracted 3 four times from 12, and that nothing remains; therefore, 3 is contained in 12 four times.

There is a shorter method of finding how many times one number is contained in another, than that of repeatedly subtracting the less number from the greater, and this method is called *division;* when I wish to find how many times a less number is contained in a greater, I divide the greater by the less, and instead of expressing the operation, by repeated subtractions, I express it by division. Thus, if it be required to express the division of 12 by 3, instead of writing it, 12 less 3 less 3 less 3 less 3, is 0, which shows that there are four 3s in 12, I should write it thus: twelve divided by three are equal to four. The expression of the division of 9 by 3 will be thus: 9 divided by 3 are equal to 3.

When any number is divided by a less number, the answer shows how many times the less number is contained in the greater number. Thus if I divide six by two, I find that two is contained in six three times, or that two is one

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third of six; if I divide a number by 2 the answer will be one half of the number which is divided; if I divide a number by 3, the answer will be one third of that number; if I divide a number by 4, the answer will be one fourth; if by 5, it will be one fifth; if by 6, it will be one sixth; if by 7, it will be one seventh; if by 8, it will be one eighth; if by 9, it will be one ninth; and if by 10, it will be one tenth.

The following table contains examples of the division of numbers from 1 to 100. The pupil must be thoroughly instructed in the exercises of this table.

2 are contained in 2 once.

2 divided by 2 is 1.

2 are contained in 4 twice; 2 are one half of 4.

2 are contained in 6 three times; 2 are one third of 6.

2 are contained in 8 four times; 2 are one fourth of 8.

2 are contained in 10 five times; 2 are one fifth of 10.

3 are contained in 3 once.

3 are contained in 6 twice; 3 are one half of 6.

3 are contained in 9 three times; 3 are one third of 9.

3 are contained in 12 four times; 3 are one fourth of 12.

3 are contained in 15 five times; 3 are one fifth of 15.

3 are contained in 18 six times; 3 are one sixth of 18.

3 are contained in 21 seven times; 3 are one seventh of 21.

3 are contained in 24 eight times; 3 are one eighth of 24.

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3 are contained in 27 nine times; 3 are one ninth of 27.

3 are contained in 30 ten times; 3 are one tenth of 30.

4 are contained in 4 once.

4 are contained in 8 twice; 4 are one half of 8.

4 are contained in 12 three times; 4 are one third of 12.

4 are contained in 16 four times; 4 are one fourth of 16.

4 are contained in 20 five times; 4 are one fifth of 20.

4 are contained in 24 six times; 4 are one sixth of 24.

4 are contained in 28 seven times; 4 are one seventh of 28.

4 are contained in 32 eight times; 4 are one eighth of 32.

4 are contained in 36 nine times; 4 are one ninth of 36.

4 are contained in 40 ten times; 4 are one tenth of 40.

5 are contained in 5 once.

5 are contained in 10 twice; 5 are one half of 10.

5 are contained in 15 three times; 5 are one third of 15.

5 are contained in 20 four times; 5 are one fourth of 20.

5 are contained in 25 five times; 5 are one fifth of 25.

5 are contained in 30 six times; 5 are one sixth of 30.

5 are contained in 35 seven times; 5 are one seventh of 35.

5 are contained in 40 eight times; 5 are one eighth of 40.

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5 are contained in 45 nine times; 5 are one ninth of 45.

5 are contained in 50 ten times; 5 are one tenth of 50.

6 are contained in 6 once.

6 are contained in 12 twice; 6 are one half of 12.

6 are contained in 18 three times; 6 are one third of 18.

6 are contained in 24 four times; 6 are one fourth of 24.

6 are contained in 30 five times; 6 are one fifth of 30.

6 are contained in 36 six times; 6 are one sixth of 36.

6 are contained in 42 seven times; 6 are one seventh of 42.

6 are contained in 48 eight times; 6 are one eighth of 48.

6 are contained in 54 nine times; 6 are one ninth of 54.

6 are contained in 60 ten times; 6 are one tenth of 60.

7 are contained in 7 once.

7 are contained in 14 twice; 7 are one half of 14.

7 are contained in 21 three times; 7 are one third of 21.

7 are contained in 28 four times; 7 are one fourth of 28.

7 are contained in 35 five times; 7 are one fifth of 35.

7 are contained in 42 six times; 7 are one sixth of 42.

7 are contained in 49 seven times; 7 are one seventh of 49.

7 are contained in 56 eight times; 7 are one eighth of 56.

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7 are contained in 63 nine times; 7 are one ninth of 63.

7 are contained in 70 ten times; 7 are one tenth of 70.

8 are contained in 8 once.

8 are contained in 16 twice; 8 are one half of 16.

8 are contained in 24 three times; 8 are one third of 24.

8 are contained in 32 four times; 8 are one fourth of 32.

8 are contained in 40 five times; 8 are one fifth of 40.

8 are contained in 48 six times; 8 are one sixth of 48.

8 are contained in 56 seven times; 8 are one seventh of 56.

8 are contained in 64 eight times; 8 are one eighth of 64.

8 are contained in 72 nine times; 8 are one ninth of 72.

8 are contained in 80 ten times; 8 are one tenth of 80.

9 are contained in 9 once.

9 are contained in 18 twice; 9 are one half of 18.

9 are contained in 27 three times; 9 are one third of 27.

9 are contained in 36 four times; 9 are one fourth of 36.

9 are contained in 45 five times; 9 are one fifth of 45.

9 are contained in 54 six times; 9 are one sixth of 54.

9 are contained in 63 seven times; 9 are one seventh of 63.

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9 are contained in 72 eight times; 9 are one eighth of 72.

9 are contained in 81 nine times; 9 are one ninth of 81.

9 are contained in 90 ten times; 9 are one tenth of 90.

10 are contained in 10 once.

10 are contained in 20 twice; 10 are one half of 20.

10 are contained in 30 three times; 10 are one third of 30.

10 are contained in 40 four times; 10 are one fourth of 40.

10 are contained in 50 five times; 10 are one fifth of 50.

10 are contained in 60 six times; 10 are one sixth of 60.

10 are contained in 70 seven times; 10 are one seventh of 70.

10 are contained in 80 eight times; 10 are one eighth of 80.

10 are contained in 90 nine times; 10 are one ninth of 90.

10 are contained in 100 ten times; 10 are one tenth of 100.

---

1. John has four cents; how many slate pencils can he buy with them, paying two cents for each pencil?

4 divided by 2, are how many? 2 are what part of 4?

2. George has six apples, and wishes to divide them equally amongst his three sisters; how many apples must he give to each?

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6 divided by 3, are how many? 6 divided by 2, are how many? 3 are what part of 6? 2 are what part of 6?

3. A gentleman gave his son eight cents with which to buy oranges; how many could he buy, if the oranges were worth two cents apiece?

8 divided by 2, are how many? 8 divided by 4, are how many? 2 are what part of 7? 4 are what part of 8?

4. There are ten birds in cages in my room, and two birds in each cage; how many cages are there?

10 divided by 2, are how many? 10 divided by 5, are how many? 2 are what part of 10? 5 are what part of 10?

5. There are twelve fruit trees in my garden, planted in two rows; how many trees are there in a row?

12 divided by 2, are how many? 12 divided by 6, are how many? 2 are what part of 12? 6 are what part of 12?

6. How many lemons can I buy for fourteen cents, if lemons are worth two cents apiece?

14 divided by 2, are how many? 14 divided by 7, are how many? 2 are what part of 14? 7 are what part of 14?

7. John paid sixteen cents for pencils, paying two cents apiece; how many pencils did he buy?

16 divided by 2, are how many? 16 divided by 8, are how many? What part of 16 are 2? What part of 16 are 8?

8. In a gentleman's grounds there are eighteen rose bushes, in two rows; how many rose bushes are there in a row?

18 divided by 2, are how many? 18 divided

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by 9, are how many? What part of 18 are 2? What part of 18 are 9?

9. Two gentlemen paid twenty dollars at a hotel for their expenses; how much did each pay, supposing that they divided the bill equally between them?

20 divided by 2, are how many? 20 divided by 10, are how many? What part of 20 are 2? What part of 20 are 10?

10. John had nine marbles; and wished to divide them equally amongst his three brothers; how many did he give to each?

9 divided by 3, are how many? What part of 9 are 3?

11. A gentleman bought for twelve dollars three dresses of equal value for his three daughters; how much did each dress cost?

12 divided by 3, are how many? 12 divided by 4, are how many? 3 are what part of 12? 4 are what part of 12?

12. For fifteen dollars how many hats can I buy, paying three dollars for each hat?

15 divided by 3, are how many? 15 divided by 5, are how many? 3 are what part of 15? 5 are what part of 15?

13. I paid eighteen dollars for wood, paying three dollars for a cord; how many cords did I buy?

18 divided by 3, are how many? 18 divided by 6, are how many? What part of 18 are 3? What part of 18 are 6?

14. A gentleman gave twenty-one dollars to his workmen, giving three dollars to each; how many workmen had he?

21 divided by 3, are how many? 21 divided

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by 7, are how many? What part of 21 are 3? What part of 21 are 7?

15. In the fence upon one side of my garden are twenty-four posts, and three posts to every rod; how many rods long is that fence?

24 divided by 3, are how many? 24 divided by 8, are how many? 3 are what part of 24? 8 are what part of 24?

16. There are twenty-seven bushels of potatoes put up in barrels, three bushels in each barrel; how many barrels are there?

27 divided by 3, are how many? 27 divided by 9, are how many? 3 are what part of 27? 9 are what part of 27?

17. In a room there are thirty boys seated in three rows, how many are there in a row?

30 divided by 3, are how many? 30 divided by 10, are how many? 3 are what part of 30? 10 are what part of 30?

18. How many barrels of apples can I buy for sixteen dollars, at the rate of four dollars for each barrel?

16 divided by 4, are how many? 4 are what part of 16?

19. There are twenty brass nails in the top of my trunk arranged in rows, four in each row; how many rows are there?

20 divided by 4, are how many? 20 divided by 5, are how many? 4 are what part of 20? 5 are what part of 20?

20. How many peaches, at four cents each, can I buy for twenty-four cents?

24 divided by 4, are how many? 24 divided by 6, are how many? 4 are what part of 24? 6 are what part of 24?

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21. A gentleman gave twenty-eight pounds of meat to some beggars, giving four pounds to each beggar; how many beggars were there?

28 divided by 4, are how many? 28 divided by 7, are how many? 4 are what part of 28? 7 are what part of 28?

22. John reads four pages in history every day; in how many days will he read thirty-two pages?

32 divided by 4, are how many? 32 divided by 8, are how many? 4 are what part of 32? 8 are what part of 32?

23. How many miles can I travel in thirty-six hours, if I travel four miles an hour?

36 divided by 4, are how many? 36 divided by 9, are how many? 4 are what part of 36? 9 are what part of 36?

24. How many yards of ribbon, at four cents a yard, can I buy for forty cents?

40 divided by 4, are how many? 40 divided by 10, are how many? 4 are what part of 40? 10 are what part of 40?

25. John distributed fifteen marbles equally amongst his five companions; how many marbles did he give to each one?

15 divided by 5, are how many? 15 divided by 3, are how many? 3 are what part of 15? 5 are what part of 15?

26. How many days will be required for a laborer to build twenty yards of stone wall, if he build five yards a day?

20 divided by 5, are how many? 20 divided by 4, are how many? 5 are what part of 20? 4 are what part of 20?

27. If I pay five dollars a cord for wood, how many cords can I buy for twenty-five dollars?

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28. How many cords can I buy for thirty dollars? how many for thirty-five dollars? for forty dollars? how many for fifty dollars?

25 divided by 5, are how many? 5 are what part of 25?

30 divided by 5, are how many? 30 divided by 6, are how many? 5 are what part of 30? 6 are what part of 30?

35 divided by 5, are how many? 35 divided by 7, are how many? 5 are what part of 35? 7 are what part of 35?

40 divided by 5, are how many? 40 divided by 8, are how many? 5 are what part of 40? 8 are what part of 40?

45 divided by 5, are how many? 45 divided by 9, are how many? 5 are what part of 45? 9 are what part 45?

50 divided by 5, are how many? 50 divided by 10, are how many? 5 are what part of 50? 10 are what part of 50?

29. How many tops, at six cents apiece, can I buy for 12 cents?

12 divided by 6, are how many? 6 are what part of 12? 2 are what part of 12?

30. How many tons of coal can I buy for eighteen dollars, at six dollars a ton?

18 divided by 6, are how many? 18 divided by 3, are how many? 6 are what part of 18? 3 are what part of 18?

31. How many tons of coal can I buy for twenty-four dollars, at the rate of six dollars per ton?

24 divided by 6, are how many? 24 divided by 4, are how many? 6 are what part of 24? 4 are what part of 24?

32. How many tons for thirty dollars, at the same rate?

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30 divided by 6, are how many? 30 divided by 5, are how many? 6 are what part of 30? 5 are what part of 30?

33. A class of thirty-six pupils occupy six rows of seats in a school-room; how many seats are there in a row?

36 divided by 6, are how many? 6 are what part of 36?

34. How many pounds of raisins can I buy for forty-two cents, at six cents per pound?

42 divided by 6, are how many? 42 divided by 7, are how many? 6 are what part of 42? 7 are what part of 42?

35. I paid forty-eight dollars for six China vases of equal value; how many dollars did I give for each vase?

48 divided by 6, are how many? 48 divided by 8, are how many? 6 are what part of 48? 8 are what part of 48?

36. If six boys receive equal shares of fifty-four cents, what will each boy receive?

54 divided by 6, are how many? 6 are what part of 54? 9 are what part of 54?

37. If I travel six miles in an hour, in how many hours can I travel sixty miles?

60 divided by 6, are how many? 60 divided by 10, are how many? 6 are what part of 60? 10 are what part of 60?

38. James divided fourteen marbles equally amongst his two brothers; how many did he give to each?

14 divided by 2, are how many? 2 are what part of 14? 7 are what part of 14?

39. Twenty-one days are three weeks, how many days are there in one week?

21 divided by 3, are how many? 21 divided

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by 7, are how many? 3 are what part of 21? 7 are what part of 21?

40. If corn be worth seven shillings a bushel, how many bushels can I buy for twenty-eight shillings?

28 divided by 7, are how many? 28 divided by 4, are how many? 7 are what part of 28? 4 are what part of 28?

41. How many bushels of corn, at the same price, can I buy for thirty-five shillings? how many bushels for forty-two shillings? How many bushels for forty-nine shillings?

35 divided by 7, are how many? 35 divided by 5, are how many? 7 are what part of 35? 5 are what part of 35?

42 divided by 7, are how many? 7 are what part of 42?

49 divided by 7, are how many? 7 are what part of 49?

42. At seven dollars a barrel, how many barrels of flour can I buy for fifty-six dollars? How many barrels, at the same price, for sixty-three dollars? How many barrels for seventy dollars.

56 divided by 7, are how many? 56 divided by 8, are how many? 7 are what part of 56? 8 are what part of 56?

63 divided by 7, are how many? 63 divided by 9, are how many? 7 are what part of 63? 9 are what part of 63?

70 divided by 7, are how many? 70 divided by 10, are how many? 7 are what part of 70? 10 are what part of 70?

43. How many cocoa-nuts can I buy for sixteen cents, when they are worth eight cents apiece?

44. How many cocoa-nuts at the same price can I buy for twenty-four cents?

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16 divided by 8, are how many? 16 divided by 2 are how many? 8 are what part of 16? 2 are what part of 16?

24 divided by 8, are how many? 24 divided by 3 are how many? 8 are what part of 24? 3 are what part of 24?

45. In the wheels of my carriage there are thirty-two spokes, how many wheels are there, supposing there are eight spokes in a wheel?

32 divided by 8, are how many? 32 divided by 4, are how many? 8 are what part of 32? 4 are what part of 32?

46. A man has eight different kinds of birds, an equal number of each kind, there being forty in all, how many birds are there of each kind?

40 divided by 8 are how many? 40 divided by 5 are how many? 8 are what part of 40? 5 are what part of 40?

47. A military company composed of forty-eight men are arranged in eight sections, how many men are there in a section?

48 divided by 8, are how many? 48 divided by 6 are how many? 8 are what part of 48? 6 are what part of 48?

48. In a company of fifty-six men, arranged eight men in each section, how many sections would there be?

56 divided by 8, are how many? 56 divided by 7 are how many? 8 are what part of 56? 7 are what part of 56?

49. In a company of sixty-four men, arranged eight men in a section; how many sections are there?

64 divided by 8, are how many? 8 are what part of 64?

50. How many rows of mulberry trees must I

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plant, there being eight trees in each row, to plant seventy-two trees?

72 divided by 8, are how many? 72 divided by 9, are how many? 8 are what part of 72? 9 are what part of 72?

51. If I plant eighty mulberry trees in eight rows, how many trees will there be in each row?

80 divided by 8, are how many? 80 divided by 10 are how many? 8 are what part of 80? 10 are what part of 80?

52. In eighteen pints there are nine quarts, how many pints are there in one quart?

18 divided by 9, are how many? 18 divided by 2, are how many? 9 are what part of 18? 2 are what part of 18?

53. How many yards of cloth, at nine dollars a yard, can I buy for twenty seven dollars?

27 divided by 9, are how many? 27 divided by 3, are how many? 9 are what part of 27? 3 are what part of 27?

54. A gentleman bought nine yards of velvet for thirty-six dollars, how many dollars did he give for each yard?

36 divided by 9, are how many? 36 divided by 4, are how many? 9 are what part of 36? 4 are what part of 36?

55. How many boxes will be required to contain forty-five pounds of figs, if each box contains nine pounds?

45 divided by 9, are how many? 45 divided by 5, are how many? 9 are what part of 45? 5 are what part of 45?

56. On nine pages of John's book there are fifty-four pictures, equal numbers on all the pages; how many pictures are there on a page?

54 divided by 9, are how many? 54 divided

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by 6, are how many? 9 are what part of 54? 6 are what part of 54?

57. How many pictures are there on a page, if there be sixty-three pictures on nine pages, and equal numbers on all the pages?

63 divided by 9, are how many? 63 divided by 7, are how many? 9 are what part of 63? 7 are what part of 63?

58. In an orchard there are seventy-two apple trees, arranged in rows, nine trees in each row; how many rows are there?

72 divided by 9, are how many? 72 divided by 8, are how many? 9 are what part of 72? 8 are what part of 72?

59. How many ladies' dresses can be made from eighty-one yards of calico, supposing that there are nine yards in each dress?

81 divided by 9, are how many? 9 are what part of 81?

60. How many dresses can be made from ninety yards, there being nine yards in a dress?

90 divided by 9, are how many? 90 divided by 10, are how many? 9 are what part of 90; 10 are what part of 90?

61. How many copies of the Primary Arithmetic can I buy for twenty cents, each copy being worth ten cents?

20 divided by 10, are how many? 20 divided by 2, are how many? 10 are what part of 20? 2 are what part of 20?

62. How many copies of Arithmetic, at the same price, can I buy for thirty cents?

30 divided by 10, are how many? 30 divided by 3 are how many? 10 are what part of 30? 3 are what part of 30?

63. How many copies for forty cents?

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40 divided by 10, are how many? 40 divided by 4, are how many? 10 are what part of 40? 4 are what part of 40?

64. A gentleman paid fifty dollars for the passage of himself and nine companions from Boston to New York; how much did he pay for the passage of each one?

50 divided by 10, are how many; 50 divided by 5, are how many; 10 are what part of 50? 5 are what part of 50?

65. In ten boxes there are sixty pieces of calico, how many pieces are there in each box?

60 divided by 10, are how many? 60 divided by 6, are how many? 10 are what part of 60? 6 are what part of 60?

66. How many miles must I travel in each hour, if I travel seventy miles in ten hours?

70 divided by 10, are how many? 70 divided by 7, are how many? 10 are what part of 70; 7 are what part of 70?

67. How many stage tickets can I buy for eighty cents, at the rate of ten cents for each ticket?

80 divided by 10, are how many? 80 divided by 8, are how many? 10 are what part of 80? 8 are what part of 80?

68. Here is a bridge ninety feet long; how many planks lying lengthwise will extend across that bridge, supposing each plank to be ten feet long?

90 divided by ten, are how many? 90 divided by 9, are how many? 10 are what part of 90? 9 are what part of 90?

69. There are one hundred cents in a dollar, and ten cents in a dime, how many dimes are equal to one dollar?

100 divided by 10, are how many? 10 are what part of 100?

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